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CHU, HELEN OK	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/604,044	WOODCOCK ET AL.	
	Examiner	Art Unit	
	Helen O. Chu	1795	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *20 March 2008*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *21 and 23-30* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *21, 23-30* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

1. The Applicants' amendments were received on March 20, 2008. Claims 21, 28-30 have been amended. Claim 22 have been cancelled.

2. The text of those sections of Title 35, U.S.C. code not included in this action can be found in the prior Office Action.

Claim Objections

3. Claims 29 and 30 are objected to because of the following informalities: The status of the claims must be identified by appropriate identifiers. Appropriate correction is required.

Claim Rejections - 35 USC § 112

4. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

5. The rejections under 35 U.S.C 112, first paragraph on claims 21-30 for failing to comply with written description requirement are maintained. The rejection is repeated below for convenience.

6. The rejections under 35 U.S.C 112, first paragraph on claims 21-30 as failing to comply with enablement are maintained. The rejection is repeated below for convenience.

7. Claims 21, 23-30 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to

reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. Claims 21 and 28 recite "the ratio of the first molar flow rate to the second molar flow rate is equal to the ratio of the first electrochemical surface area to the second electrochemical surface area", which does not appear to be supported by the specification as filed. The Specification contains Equation (1) at [0036], however, this is just a general equation regarding molar flow rate of a reactant and does not disclose anything about first and second flow rate ratios and first and second electrochemical surface areas. Claim 28 further recites "the ratio of the third molar flow rate to the fourth molar flow rate is equal to the ratio of the third electrochemical surface area to the fourth electrochemical surface area", which is similarly rejected because the limitation does not appear to be supported by the specification as filed.

8. Claims 21, 23-30 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. The claims recite at least one flow plate which has at least two flow field paths that have path lengths different from one another such that first and second electrochemical surface areas of the flow field plate have a current density equal to one another. However, the specification does not describe the values of the different lengths of the at least two flow field paths that result in first and second electrochemical surface areas

of the flow field plate having a current density equal to one another. Paragraphs 0033-0034 are directed more towards a hypothesis than an actual inventive concept. The specification does not describe how to make or use the claimed invention. Regarding [0036], the specification does not enable how the dimensions of the flow path are selected so that the total resistance of the flow path enables a molar flow rate of reactant m represented by Equation (1). Claim 28 is likewise rejected for containing similar language

9. Claims 21, 23-30 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. Specifically, the claim recitation states that the flow field path has a molar flow rate which is not enabled. The structural limitations of the flow field plate cannot provide a flow rate. Flow rates are used to describe the distance fluid flows over time, in which a flow field path certainly cannot be described by a flow rate.

Claims 21, 23-30 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. The chemical formula presented as $m = (i \times A \times s)/(n \times F)$ and somehow the chemical formula would be a ratio of $(m_1/m_2) = (A_1/A_2)$, however, in order for the formula

to even be $(m_1/m_2) = (A_1/A_2)$ the formula must reach $m_1=A_1$ and $m_2 = A_2$. The formula has to have $(i \times s)/(n \times F) = 1$, the specification is silent as to the values of "i," "s" and "n." Therefore, one of ordinary skill in the art cannot come to the conclusion of the ratios due to the disclosure of the specification.

10. Claims depending from claims rejected under 35 U.S.C. Rejection 112, first paragraph are also rejected for the same.

11. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

12. The rejections under 35 U.S.C 112, second paragraph on claims 21 and 28 are maintained. The rejection is repeated below for convenience.

13. The rejection under 35 U.S.C 112, second paragraph on claim 21 is withdrawn because the Applicants amended the claim.

14. The rejection under 35 U.S.C 112, second paragraph on claim 22 is withdrawn because the Applicants have cancelled the claims.

15. The rejection under 35 U.S.C 112, second paragraph on claim 28 is withdrawn because the Applicants amended the claim.

16. The rejections under 35 U.S.C 112, second paragraph on claim 29 and 30 are withdrawn because the Applicants amended the claims

17. Claims 21 and 28 recite "the ratio of the first molar flow rate to the second molar flow rate is equal to the ratio of the first electrochemical surface area to the second electrochemical surface area", which is indefinite. It is unclear how the

molar flow rate of the reactant through the flow field and the electrochemical surface area serviced are related.

18. Claims 21, 23-30 recite," substantially different." It is unclear what "substantially different" means based on the disclosure of the Applicants specification. "Substantially different" is subjective and broad. MPEP states 2173.05(b) states that the term s substantially" is often used in conjunction with another term to describe a particular characteristic of the claimed invention. It is a broad term. Therefore, because it was not described in the MPEP what is substantially different or substantially the same, one of ordinary skill in the art is not able to differentiate what is considered substantially different.

19. Claims 21, 23-30 recites limitations of m= *(i x A x s)/(n x F)*, however, it is silent as to what "i," "s," and "n" are to calculate $m_1=A_1$, $m_2=A_2$ to even derived the claimed language of the ratios of the molar flow rates is equal to the areas.

Claims Analysis

The structure of the claim limitation is given patentable weight, however, the functional claim language is not given patentable weight. Some examples include: the formula presented as *m= (i x A x s)/(n x F)*, the way in which the molar flow rate is calculated is not given patentable weight.

Claim Rejections - 35 USC § 102

20. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

21. The rejections under 35 U.S.C 102(b), as anticipated by Cavalca et al., on claims 21, 23, 24, 26 and 28-30 are maintained. The rejection is repeated below for convenience.

22. The rejections under 35 U.S.C 102(e), as anticipated by Boff et al., on claims 21, 23-28 and 30 are maintained. The rejection is repeated below for convenience.

23. Claims 21, 23, 24, 26 and 28-30 are rejected under 35 U.S.C. 102(b) as being anticipated by Cavalca et al., US 5,686,199.

Cavalca teaches a flow field plate for use in a proton exchange membrane fuel cell. The plate includes a network of flow passages (at least two flow field paths) for supplying the fuel or oxidant to the flow field and a network of flow passages for receiving the gases discharging from the flow field. Each flow sector includes a plurality of substantially parallel flow channels formed in the substantially planar plate surface, with each sector partitioned so as to subdivide

the channels into a plurality of sets of channels disposed in serial flow relationship. The flow field configuration permits the reactant gases to be transported so as to supply the gases evenly to the entire active area of the corresponding fuel cell electrode with very low reactant gas pressure drop (abstract). The widths of the flow channels are selected so that the reactant gases flowing through each of the flow channels is permitted to diffuse outward through the porous backings of the corresponding electrodes in a manner which distributes the reactant gases to the entire active area of the anode and cathode of the fuel cell. The width and depth of the channels may be substantially constant along the length of each of the channels (7:1-53). Note the Figures. Thus the claims are anticipated.

24. Claims 21, 23-28 and 30 are rejected under 35 U.S.C. 102(e) as being anticipated by Boff et al., US 7,067,213.

Boff teaches flow field plate geometries wherein the flow field plate is used for a fuel cell. The plate comprises on at least one face an assembly of channels comprising one or more gas delivery channels and a plurality of gas diffusion channels connecting thereto (abstract). By forming sufficiently fine channels on the face of the flow field plates, the reactant gases are evenly distributed across the electrodes of the fuel cell (2:64-67). The narrow channels result in reduction in resistive electrical losses in the gas diffusion layer (4:10-14). The channels may be of varying width (4:31-34). The pattern of channels may have different widths and depths. Applying such a pattern of channels of varying width and

depth has advantages such as ensuring uniform supply of reactant material to the electrodes and to ensure prompt removal of reacted products (5:6-16). Note the Figures. Thus the claims are anticipated.

Claim Rejections - 35 USC § 103

25. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

26. The rejections under 35 U.S.C 103(a), as being unpatentable over Debe et al. are maintained. The rejection is repeated below for convenience.

27. Claims 21, 23-30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Debe et al., US 6,780,536.

Debe teaches flow fields for uniform distribution of fluids or their active components or properties to and from a target area (2:32-36). The flow field may be embodied in a flow filed device such as a flow field plate or bipolar plate used for distribution of reactants to, and removal of products from, opposite sides of a catalyzed membrane in an electrochemical cell such as a fuel cell (1:10-15). The flow fields provide more uniform access of the fluid or its active component to the target area by providing highly uniform lateral flux through the fluid transport layer separating the flow field from the target area for the transported fluid (4:54-61). Uniform distribution of the fuel cell reactants (fuel and oxidant) over the catalyst electrodes in a fuel cell should result in more uniform utilization of the catalyst,

resulting in better performance, stability and durability. Furthermore, the flow fields result in more uniform distribution of current density and waste heat generation. It is believed that the partial pressures of fuel and oxidant at the surface of the catalyst at any given point in an electrode of a fuel cell are directly related to the speed of the lateral flux of the gas in the DCC (5:50-65). The flow field includes significant land areas and may be composed of a single or multiple channels. The active area of the flow field may be any suitable size and shape and may be subdivided into separate zones serving separate portions of the target area. The flow field channels may have any suitable cross-section (6:32-57). Designs having non-parallel sequential channel segments may include a "zig-zag" serpentine design comprising at least one serpentine channel having non-parallel sequential major segments. The major segments may be curved, but are typically straight line segments. Turning segments may be made up of curved segments or one or more straight segments. Alternately the major segments may meet at a point (8:43-9:63).

Debe does not explicitly teach the at least two flow field paths have lengths different from one another. However, the invention as a whole would have been obvious to one having ordinary skill in the art at the time the invention was made because Debe teaches the active area may be subdivided into separate zones serving separate portions of the target area and treating each portion as a single target area, served by a single channel or a channel composed of multiple courses. The active area can be any suitable size and shape (6:45-54). The channels may terminate at one end in a single or multiple opening inlet and at

another end in a single or multiple opening outlet (6:55-67). Therefore, Debe at least suggests that the flow field paths may have lengths different from one another. Also, equation 2 of Debe shows the total pressure varied linearly along the flow channel so the pressure drop is proportional to the path length.

Response to Arguments

28. Applicant's arguments filed March 20, 2008 have been fully considered but they are not persuasive.

The Applicants principal arguments are:

A) Applicants argue," *that a person of ordinary skill in the art, reading the disclosure in the specification at [0039] (see Patent Application Publication No. 2004/0265675 A I) that a first molar flow rate may be proportional to a first electrochemical surface area serviced by a first flow field path, a second molar flow rate may be proportional to a second electrochemical surface area serviced by a second flow field path, each defined by equation (1), would understand that the ratio of the first molar flow rate to the second molar flow rate is equal to ratio of the first area serviced and the second area serviced when the first and second areas serviced have a current density equal to one another. The simple arithmetic manipulation required to demonstrate such a relationship can easily be performed by a skilled artisan and is demonstrated below, wherein i, s, and n are the same for the first and second flow field paths.*

$m_1 = (i \times A_1 \times s)/(n \times F) = A_1$

m2 = (i x A2 x s) / (n x F) m2 = A_2 " However, the chemical formula presented as *m = (i x A x s)/(n x F)* and somehow the chemical formula would be a ratio of *(m_1/ m_2) = (A_1 / A_2)*, however, in order for the formula to even be *(m_1/ m_2) = (A_1 / A_2)* the formula must reach m_1=A_1 and m_2 = A_2. The formula has to have *(i x s)/(n x F)* = 1, the specification is silent as to the values of "i," "s" and "n." Therefore, one of ordinary skill in the art cannot come to the conclusion of the ratios due to the disclosure of the specification. Once these variables are given, the Examiner understands the relation in the first molar flow rate to the first surface area and the second molar flow rate to the second surface area but this equation nor does the Applicants specifications describe the "ratio of the first molar flow rate to the second molar flow rate is equal to the ratio of the first electrochemical surface area to the second electrochemical surface area," that is how from the above equation provided by the Applicants, one of ordinary skill in the art achieves *(m_1/ m_2) = (A_1 / A_2)* a relationship between the first and second flow rates and their respective surfaces to each other. The specification does not describe the ratios of the molar flow rates and the surface areas to be the same and no further relationship can be made by the disclosure of the specification.

B) Applicant's argue, " *Applicants respectfully submit that the specification provides ample disclosure of how a person of ordinary skill in the art to make and use the fuel cells required in Applicants' amended claims. First, the specification teaches that for a given flow field path that services an electrochemical surface area, A, the formula m = (i x A x s) / (n x F) can be used to determine the molar flow rate of each flow path, where i = current density of the surface area serviced*

by the flow field path, s = fuel utilization efficiency, n = moles of electrons produced by the fuel cell per mole of the reactant consumed, and F = Faraday's constant. Thus, a skilled artisan may chose a first flow field path (e.g., flow field path 350 in FIG. 3A in the specification) which services a first electrochemical surface area (e.g., electrochemical surface area 356 in FIG. 3A in the specification) and determine the first molar flow rate using the aforementioned formula, a desired current density, a fuel utilization efficiency between 0.75 to 1, as required by amended claims 21 and 28, the moles of electrons produced by the fuel ceil per mole of the reactant consumed, and Faraday's constant. Next, a second molar flow rate of a second electrochemical service area may be easily calculated, since the claims require that the ratio of the first molar flow rate to the second molar flow rate is equal to the ratio of the first electrochemical surface area (e.g., electrochemical surface area 356 in FIG. 3A in the specification) to the second electrochemical surface area chosen (e.g., electrochemical surface area 346 in FIG. 3A in the specification).

Using this second molar flow rate, the dimensions, including the length, of the second flow field path may be determined by adjusting the geometry of the flow field channels as described in the specification. For example, at paragraph [0038] (see Patent Application Publication No. 2004/0265675 A1), the specification teaches that "[T]he length of the flow field path may be substantially proportional to a surface area of a flow field plate serviced by that flow field path..." and that channels forming a flow field path may be proportional in cross-sectional area to the flow plate surface area serviced by that flow field path.

Thus, a person of ordinary skill in the art could easily calculate a second length of the second flow field path by multiplying the first length of the first flow field path by a ratio of the second electrochemical surface area to the first electrochemical surface area. Once the second length of the second flow field path is determined, the width and depth of channels forming the flow field path could be adjusted to provide the second molar flow rate such that there is equal current density for the first and second electrochemical surface areas. Thus, the specification completely enables a person of ordinary skill in the art to make and use the claimed fuel cells without undue or unreasonable experimentation. Therefore, the rejection should be withdrawn." However, the chemical formula presented as $m = (i \times A \times s)/(n \times F)$ and somehow the chemical formula would be a ratio of $(m_1/ m_2) = (A_1 / A_2)$, however, in order for the formula to even be $(m_1/ m_2) = (A_1 / A_2)$ the formula must reach $m_1=A_1$ and $m_2 = A_2$. The formula has to have $(i \times s)/(n \times F) = 1$, the specification is silent as to the values of "i," "s" and "n." Therefore, one of ordinary skill in the art cannot come to the conclusion of the ratios due to the disclosure of the specification. After the variables are defined, the Examiner understand how the equation is calculated, however, the relationship between the ratios of the first and second flow rate is considered new matter, the Applicant never once stated the relationship between the two flow rates and the surface in the specification until a claim amendment dated October 22, 2007 and thus rejected as such. In admittance the Applicants states," Next, a second molar flow rate of a second electrochemical service area may be easily calculated, **since the claims require** that the ratio of the first molar flow rate to the second

molar flow rate is equal to the ratio of the first electrochemical surface area" these limitations were not provided until the claim amendment dated October 22, 2007 in which was rejected under new matter, therefore these arguments with such limitations have been considered but are moot until the Applicants explain where the relationship is found in the original disclosure without providing new matter. The Applicants indicated 356 in Fig. 3A and 346 in Fig. 3A, however there isn't a relationship with each other concerning the ratios.

C) The Applicant's argue," *In particular, Applicants respectfully submit that the limitation that "the ratio of the first molar flow rate to the second molar flow rate is equal to the ratio of the first electrochemical surface area to the second electrochemical surface area" clearly defines the scope of the claims to a person of ordinary skill in the art. As outlined above, a skilled artisan would easily understand that this phrase specifies:*

$m_1 = A_1$

$m2 = A_2$ " Again, the chemical formula presented as $m = (i \times A \times s)/(n \times F)$ and somehow the chemical formula would be a ratio of $(m_1/m_2) = (A_1/A_2)$, however, in order for the formula to even be $(m_1/m_2) = (A_1/A_2)$ the formula must reach $m_1=A_1$ and $m_2 = A_2$. The formula has to have $(i \times s)/(n \times F) = 1$, the specification is silent as to the values of "i," "s" and "n." Therefore, one of ordinary skill in the art cannot come to the conclusion of the ratios due to the disclosure of the specification. Once, the variable is defined, the Examiner understands how this relationship is derived but what is claimed is this relationship $(m_1/m_2) = (A_1/A_2)$ which is very different than the previous relationship $m_1 = A$, *and* $m2 = A_2$.

The relationship as presented by the Applicants does not draw a relationship to ratios, it only indicates the relationship individually between the first molar flow rate to the first area and the second molar flow rate to the second area. Therefore, until the Applicants provide an explanation of $(m_1/ m_2) = (A_1 / A_2)$ without adding new matter, the rejection is sustained.

D) Applicant argues, *"Cavalca teaches that the average path length that reactant gases follows through any of the substantially symmetric flow sectors in a fuel cell is substantially the same. See Col. 8, line 64 to Col, 9, line 1. Cavalca is completely devoid of any explicit or inherent disclosure of flow field paths having different lengths at all, and certainly not substantially different lengths, as required by Applicants' amended claims. "A claim limitation is inherent in the prior art if it is necessarily present in the prior art, not merely probably or possibly present." Akamai Techs. tnc. v. Cable & Wireless Internet Servs., Inc,, 344 F.3d 1186, 1 t92, 68 U,S.P.Q.2D (BNA) 118(Fed. Cir. 2003). Merely stating that average reactant path lengths are substantially the same would not lead a skilled artisan to infer that flow field paths having different lengths at all, and certainly not substantially different lengths, are necessarily present in Cavalca."* However, these arguments are merely assertions of the Applicants. One of ordinary skill in the art would observe that Fig. 2 illustrates the horizontal length of 60C is longer than 60D at the right portion of the plate. Therefore the horizontal length between the 60C and 60D is substantially different. Furthermore, substantially the same and substantially different is subjective. One of ordinary skill in the art can interpret the Applicants disclosure to be substantially the same the

disclosure of Cavalca to be substantially different. "Substantially different" is subjective and broad. MPEP states 2173.05(b) states that the term substantially" is often used in conjunction with another term to describe a particular characteristic of the claimed invention. It is a broad term. Therefore, because it was not described in the MPEP what is substantially different or substantially the same, one of ordinary skill in the art is not able to differentiate what is considered substantially different

E) Applicant argues, "*In addition, Cavalca provides no disclosure or suggestion of applying the formula:*

m = (i x A x s) / (n x F) to the design of a flow field plate.

Furthermore, Cavalca fails to disclose a first flow field path having a first molar flow rate servicing a first electrochemical surface area and a second flow field path having a second molar flow rate servicing a second electrochemical surface area, where the ratio of the first molar flow rate to the second molar flow rate is equal to the ratio of the first electrochemical surface area to the second electrochemical surface area. Support for this statement is found in the entire specification of Calavca, which is devoid of any disclosure or suggestion of the relationship between the molar flow rate and the electrochemical surface area of a flow field path. Moreover, M.P.E.P. § states that the burden is on the USPTO to set forth a prima facie case of unpatentability. As such a prima facie case has not been presented, Applicants' claims are novel over Calvaca" Surely the Applicants do not think the formula presented is novel. Though the Calvaca reference does not explicitly recite the formula used by the Applicants invention, the formula is

used to calculate the molar flow rate is a functional claim language, one of ordinary skill in the would know how to calculate the flow rate once the variables are given.

F) Applicant argues, "Boff is devoid of any disclosure which would enable one of ordinary skill to determine relative lengths of two flow field paths or the molar flow rates relative to an electrochemical areas serviced by flow field paths of the reactant gases as they flow through the described channels. Thus, Boff fails to disclose flow field paths having substantially different lengths, as required by Applicants' amended claims," However, Fig. 2 and 5 of Boff illustrates flow file plates with substantially different lengths. Furthermore, substantially the same and substantially different is subjective. One of ordinary skill in the art can interpret the Applicants disclosure to be substantially the same the disclosure of Boff to be substantially different. "Substantially different" is subjective and broad. MPEP states 2173.05(b) states that the term substantially" is often used in conjunction with another term to describe a particular characteristic of the claimed invention. It is a broad term. Therefore, because it was not described in the MPEP what is substantially different or substantially the same, one of ordinary skill in the art is not able to differentiate what is considered substantially different.

G) Applicant argues," *In addition, Boff fails to disclose a first flow field path having a first molar flow rate servicing a first electrochemical surface area and a second flow field path having a second molar flow rate servicing a second electrochemical surface area, where the ratio of the first molar flow rate to the*

second molar flow rate is equal to the ratio of the first electrochemical surface area to the second electrochemical surface area.

Moreover, Boff provides no disclosure or suggestion of applying the formula:

m = (i x A × s) / (n x F) to the design of a flow field plate. Thus, Applicant's claims are novel over Boff." Surely the Applicants do not think the formula presented is novel. Though the Calvaca reference does not explicitly recite the formula used by the Applicants invention, the formula is used to calculate the molar flow rate which is a functional claim language, one of ordinary skill in the would know how to calculate the flow rate once the variables are given.

H) The Applicant argues," The U.S. Supreme Court recently stated that "a patent composed of several elements is not proved obvious merely by demonstrating that each of its elements was, independently, known in the prior art." KSR Int'l Co. v. Teleflex Inc., 550 U.S. __ (2007) (Slip Op. at t4).
The Court further stated that "it will be necessary ... to look to interrelated teachings of multiple patents; the effects of demands known to the design community or present in the marketplace; and the background knowledge possessed by a person having ordinary skill in the art, all in order to determine whether there was an apparent reason to combine the known elements in the fashion claimed.." Id. The rejection here is based upon reasons that neither are apparent nor suggest modifying the elements of Debe in the precise fashion claimed." However, a patent for a combination, which only unites old elements with no change in their respective functions, obviously withdraws what is already

known into the field of its monopoly and diminishes the resources available to skillful men. Where the combination of old elements performed a useful function, but it added nothing to the nature and quality of the subject matter already patented, the patent failed under §103. When a patent simply arranges old elements with each performing the same function it had been known to perform and yields no more than one would expect from such an arrangement, the combination is obvious.

Common sense teaches that familiar items may have obvious uses beyond their primary purposes, and in many cases a person of ordinary skill will be able to fit the teachings of the patents together like pieces of a puzzle. A person of ordinary skill is also a person of ordinary creativity, not an automaton. The question to be answered is whether the claimed invention is a product of innovation or merely the result of common sense, ordinary creativity, and ordinary skill.

A patent claim can be proved obvious merely by showing that the combination of elements was obvious to try. When there is a design need or market pressure to solve a problem and there are a finite number of identified, predictable solutions, a person of ordinary skill has good reason to pursue the known options within his or her technical grasp. If this leads to the anticipated success, it is likely the product is not of innovation but of ordinary skill and common sense. **KSR v. Teleflex**

I) Applicant's argue," No specific apparent reason is present in Debe as to why a skilled artisan would provide 1) at least two flow field paths having

substantially different lengths, or even different lengths, 2) a ratio of a first molar flow rate for a first flow field path to the second molar flow rate for a second flow field path which is equal to a ratio of a first electrochemical surface area serviced by the first flow field path to the second electrochemical surface area serviced by the second flow field path; and 3) a flow field plate utilizing the formula: m = (i × A x s) / (n x F) for its design, required by Applicants' amended claims." However, Fig. 13 as disclosed by Debe illustrates a flow path with vertical length to be substantially different from one another. In addition to, substantially the same and substantially different is subjective. One of ordinary skill in the art can interpret the Applicants disclosure to be substantially the same the disclosure of Debe to be substantially different. "Substantially different" is subjective and broad. MPEP states 2173.05(b) states that the term substantially" is often used in conjunction with another term to describe a particular characteristic of the claimed invention. It is a broad term. Therefore, because it was not described in the MPEP what is substantially different or substantially the same, one of ordinary skill in the art is not able to differentiate what is considered substantially different. Again, the chemical formula presented as $m = (i \times A \times s)/(n \times F)$ and somehow the chemical formula would be a ratio of $(m_1/m_2) = (A_1/A_2)$, however, in order for the formula to even be $(m_1/m_2) = (A_1/A_2)$ the formula must reach $m_1=A_1$ and $m_2 = A_2$. The formula has to have $(i \times s)/(n \times F) = 1$, the specification is silent as to the values of "i," "s" and "n." Therefore, one of ordinary skill in the art cannot come to the conclusion of the ratios due to the disclosure of the specification. Once, the variable is defined, the Examiner understands how this relationship is derived but

what is claimed is this relationship $(m_1/m_2) = (A_1/A_2)$ which is very different than the previous relationship $m_1 = A$, *and* $m2 = A_2$. The relationship as presented by the Applicants does not draw a relationship to ratios, it only indicates the relationship individually between the first molar flow rate to the first area and the second molar flow rate to the second area. Surely the Applicants do not think the formula presented is novel. Though the Calvaca reference does not explicitly recite the formula used by the Applicants invention, the formula is used to calculate the molar flow rate which is a functional claim language, one of ordinary skill in the would know how to calculate the flow rate once the variables are given.

Conclusion

29. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will

the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Helen O. Chu whose telephone number is (571) 272-5162. The examiner can normally be reached on Monday-Friday 8am-4:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick Ryan can be reached on (571) 272-1292. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

HOC

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